

US EPA ARCHIVE DOCUMENT

December 8-9, 2010 FIFRA SAP Meeting

Scientific issues Associated with Insect Resistance Management for SmartStax™ Refuge-in-the-Bag, a Plant-Incorporated Protectant (PIP) Corn Seed Blend

Biosketches of FQPA Science Review Board Members

Dr. David A. Andow is a Distinguished McKnight University Professor in the Department of Entomology at the University of Minnesota where he teaches, conducts research, and advises graduate students in applied ecology and evolution related to agriculture, insects, and conservation. Dr. Andow has a Ph.D. in Ecology from Cornell University, and is noted for his work on arthropods and vegetational diversity, natural and conservation biological control of arthropods, evolution of resistance in arthropods to plants, ecological risk assessment of transgenic crops, and the ecology of invasive species. He has served on advisory panels to the National Institutes of Health (NIH), the World Health Organization (WHO), the Food and Agriculture Organization (FAO), the World Trade Organization (WTO), the Convention on Biological Diversity (CBD), the International Assessment of Agricultural Science and Technology for Development (IAASTD) and the North American Free-Trade Alliance-Commission for Environmental Cooperation (NAFTA-CEC). Within the United States, he has served on advisory committees to the US National Academy of Sciences, the US Department of Agriculture, the US Department of Interior, and the US Environmental Protection Agency. He teaches graduate courses in insect ecology and ecological risk assessment. He has interacted collegially with scientists in Brazil, Japan, Korea, Vietnam, Australia, Saudi Arabia, Greece, Italy, Switzerland, Spain, France, Germany, and Denmark.

Dr. Fred L. Gould is the William Neal Reynolds Professor Agriculture in the Department of Entomology and Adjunct Professor in the Department of Genetics at the North Carolina State University in Raleigh, North Carolina. He graduated from Queens College in New York City with a B.A. in Biology. He received his Ph.D. in Ecology and Evolutionary Biology from the State University of New York at Stony Brook. Dr. Gould's research has examined evolutionary approaches for dealing with agricultural problems. Since 1986, he has conducted theoretical and empirical research aimed at increasing the evolutionary sustainability of transgenic insecticidal crops. He has also conducted more basic research aimed at understanding the ecological and genetic factors that shape herbivore host range and that enable the evolution of complex traits such as sexual communication systems. Recently, Dr. Gould has begun using evolutionary theory in designing strategies for effective use of transgenic insects for control of insect-vectored human diseases. He has served on the EPA FIFRA Scientific Advisory Panel.

Dr. Anthony R. Ives is a Professor in the Department of Zoology at the University of Wisconsin in Madison, Wisconsin. Dr. Ives has degrees in biology and mathematics from the University of

Rochester (1983), a M.A. degree in biology (1985) and a Ph.D. in biology (1988) from Princeton University. Prior to his appointment at the University of Wisconsin, he was with the Life Sciences Research Foundation Fellowship at the University of Washington. Dr. Ives' research interests combine both theoretical and empirical approaches to investigate a variety of ecological and evolutionary problems. His main research projects include the impact of species interactions and environmental disturbances on the dynamics of ecological communities, population control of agricultural aphid pests by natural enemies, phylogenetically-based statistical methods for analyzing comparative data and the structure of communities and evolution of resistance by agricultural pests to insecticidal genetically modified crops. Current research projects involve developing statistical models to understand the structure of ecological communities using information about the phylogenetic history of constituent species for the National Science Foundation and exploring the interactions within the pea aphid food web to explore the regulation of pea aphid densities and the suppression of densities below economic thresholds for the United States Department of Agriculture. Dr. Ives has served on previous EPA FIFRA Scientific Advisory Panels.

Dr. Jeremy A. Kroemer is a Research Entomologist with the USDA/ARS in Ames, Iowa. Dr. Kroemer earned his B.S. in molecular biology from the University of Nebraska at Kearney, and a Ph.D. in entomology from the University of Kentucky. His areas of interest range from general entomology to virology, genetics, and molecular biology, and his areas of expertise focus on the technologies and methodologies underlying molecular research and its applications in agriculture. His research is focused on understanding European corn borer (*Ostrinia nubilalis*) behavioral responses to transgenic Bt crops, molecular mapping of sex-linked traits, behavioral genetics, and the molecular interactions governing specific responses to biological and environmental stimuli in this corn pest. Prior to his position with USDA/ARS, Dr. Kroemer worked at and played a key role in the establishment of ParaTechs Corporation, a startup biotechnology company located in Lexington, Kentucky. He has been a contributor to several professional scientific societies including the American Society for Virology, Entomological Society of America, Arthropod Genomics Symposium, and USDA NC-205 meetings.

Dr. Steven L. Peck is an Associate Professor in the Department of Integrative Biology at Brigham Young University. Dr. Peck received his Ph.D. in Biomathematics and Entomology from North Carolina State University. He received his M.S. degree in Environmental Biostatistics at the University of North Carolina at Chapel Hill and his B.S. degree in Statistics from Brigham Young University. The general focus of his research revolves around the rates and modes of evolution in spatially complex systems. He has developed mathematical and computer models of the spread of insect resistance in complex regions of transgenic cotton plantings. These models have been used by the EPA in developing strategies to manage insect resistance to Bt cotton. Before coming to Brigham Young University, he worked for the USDA-ARS in the Pacific Basin Agricultural Research Center in Hilo, Hawaii on problems related to the movement and control of tephritid fruit flies. Dr. Peck has served on a previous EPA FIFRA Scientific Advisory Panel (2004) and on USDA CREES grant review panels (2005, 2006). He has served as a consultant to the Korean government on developing strategies for managing insect resistance to Bt crops. Recently, he worked on a USDA-EPA collaborative research program to gain a

comprehensive understanding of the complex simulation models that have been used to inform government agencies on the spread of resistance in transgenic crops. He teaches classes in Environmental Science, Ecology and the History and Philosophy of Biology.

Dr. Susan T. Ratcliffe is Director of the USDA North Central Integrated Pest Management Center in the Department of Crop Sciences at the University of Illinois at Urbana-Champaign. She also serves as Extension Specialist in Integrated Pest Management, as an Affiliate with the Department of Entomology and as an Assistant Professional Scientist for the Institute of Natural Resource Sustainability. Dr. Ratcliffe earned a M.S. degree (1995) and a Ph.D. (1999) in entomology from the University of Illinois, Urbana-Champaign. She has published many articles related to pest management and crop production, with emphasis on Western Corn Rootworm and has lectured widely on her research efforts. Dr. Ratcliffe has served on a previous EPA FIFRA Scientific Advisory Panel.

Dr. Richard T. Roush is Professor and Dean of the Melbourne School of Land and Environment at the University of Melbourne in Victoria, Australia. Dr. Roush earned his B.S. and Ph.D. in entomology from UC Davis in 1976 and UC Berkeley in 1979, respectively. For the past 30 years, he has been an integral contributor to the development of integrated solutions for slowing or preventing the evolution of pesticide resistance and has also published extensively in the areas of biological control and the ecology of insects, mites and weeds. He has been involved in pest management efforts in China, the Philippines, Malaysia, South Africa and India. In the 1990's, Dr. Roush was a principal architect of the resistance management strategies for insect tolerant transgenic crops, including cotton, potatoes and corn, directly in Australia and the US, and indirectly in Canada and Mexico. He has served as Director of the University of California (UC) Integrated Pest Management Program (2003-2006) and Director of the UC Sustainable Agriculture Research Education Program (SAREP) (2004-2006). He has also served as the Director of the national Australian Cooperative Research Centre (CRC) for Weed Management based at the University of Adelaide, and coordinated weed management research and extension on crops and natural ecosystems at 19 state, federal, industry, and university organizations across Australia. Dr. Roush has held several senior appointments in the U.S. and Australia, including on a committee reviewing pesticide resistance for the U.S. National Academy of Sciences (1984-86) and on the Australian Genetic Engineering Regulatory Committee (1998-2003). He has served on previous EPA FIFRA Scientific Advisory Panels.

Dr. Mark Sears is Professor Emeritus in the Department of Entomology at University of Guelph in Guelph, Ontario. Dr. Sears earned his Ph.D. in Entomology from the University of California-Davis. His research interests have been in the biology and control of insect pests of field crops, management of resistance to insecticides, and non-target effects of transgenic crops. In 2001, he was one of the key contributors to a U.S.-Canada private and public sector collaborative research effort characterizing the risk associated with Bt corn pollen to the monarch butterfly. In 2002, he co-founded with Dr. Art Schaafsma, the Ontario Bt Corn

Coalition, a group consisting of growers, Provincial extension personnel, publically-funded researchers from AAFC and University of Guelph, and seed industry representatives whose collective interest was deployment of Bt technology in Ontario. He participated in the USDA, North Central Regional Research Committee (NC-205) whose focus is on stalk-boring pests of corn. Dr. Sears has served on previous EPA FIFRA Scientific Advisory Panels.

Dr. Jon J. Tollefson is a Professor in the Department of Entomology at Iowa State University in Ames, Iowa. Dr. Tollefson received his Ph.D. in Entomology from Iowa State University, where he specialized in applied ecology and sampling. He joined Iowa State University in 1975 to lead the Corn Insect Research Project (CIRP). The objective of this project has been to develop and evaluate efficient and environmentally sensitive insect management strategies for insects attacking corn. Dr. Tollefson led the CIRP project for 32 years ending in January of 2008. During that time, he evaluated the effectiveness of pest management programs, developed sampling protocols and economic decision thresholds for pest insects, and evaluated control tools and strategies, including insecticides and genetically-engineered corn varieties. Since 2008, he has focused on his teaching and extension responsibilities. He has served on a previous EPA FIFRA Scientific Advisory Panel.

Dr. John K. Westbrook is a Research Meteorologist and Research Leader of the Areawide Pest Management Research Unit (“the Unit”) at the USDA-ARS Southern Plains Agricultural Research Center in College Station, Texas. Dr. Westbrook earned a B.S. degree in Meteorology from San Jose State University (1977) and earned M.S. and Ph.D. degrees in Biometeorology from Utah State University (1980, 1982). Since joining USDA-ARS in 1982, Dr. Westbrook has conducted meteorological research to: investigate meteorological impacts on insect population development, assess contributions of atmospheric factors and behavior to insect dispersal, develop and validate models of pest insect population development and dispersal, and assess meteorological impacts on the diffusion of volatile attractants for adult pest control technology. He pioneered the use of dispersion models, tetroons, and NEXRAD Doppler weather radars for predicting area-wide densities of migratory insects. In recent collaborative research, Dr. Westbrook has contributed to investigations of the aeroecology of Brazilian free-tailed bats and their insect prey, which include many agriculturally important pest species. As Research Leader, he supervises research entomologists, a research palynologist, a research chemist, and agricultural engineers. He has contributed to more than 90 publications and has participated as a co-PI on extramural grants totaling more than \$3M. His contributions to insect pest management have been recognized by USDA-APHIS-PPQ (1990) and the Southwestern Branch of the Entomological Society of America (ESA) (2000). Dr. Westbrook was a co-recipient of the USDA-ARS Outreach, Diversity, and Equal Opportunity Award (2007). He is a member of the ESA, the Society of Southwestern Entomologists, and the American Meteorological Society (AMS) and has served as a member and chair of the AMS Committee on Biometeorology and Aerobiology. Dr. Westbrook is an active member of several pest-related regional projects, twice serving as chair of the NCERA-148 Project “Migration and Dispersal of Agriculturally Important

Biota” and currently serving as a member of the Technical Advisory Committees for the Boll Weevil Action Committee and the Texas Boll Weevil Eradication Foundation.